

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 06 November 2000 (06.11.00)	
International application No. PCT/GB00/01020	Applicant's or agent's file reference N.76269A MN
International filing date (day/month/year) 17 March 2000 (17.03.00)	Priority date (day/month/year) 19 March 1999 (19.03.99)
Applicant BRADY, John, Michael et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
14 September 2000 (14.09.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference N.76269A MN	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/01020	International filing date (day/month/year) 17/03/2000	Priority date (day/month/year) 19/03/1999
International Patent Classification (IPC) or national classification and IPC G06T7/20		
Applicant ISIS INNOVATION LIMITED		


1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 14/09/2000	Date of completion of this report 30.03.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Müller, M Telephone No. +49 89 2399 7409



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/01020

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

1-19 as originally filed

Claims, No.:

1-23 as originally filed

Drawings, sheets:

1/10-10/10 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/01020

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-23 (insofar as being clear)
	No:	Claims	
Inventive step (IS)	Yes:	Claims	6-9 (after due clarification only)
	No:	Claims	1-5, 10-23
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Citations

Reference is made to the following document:

D1: WO 95 26539 A (IDT INTERNATIONAL DIGITAL TECHNOLOGIES
DEUTSCHLAND GMBH) 5 October 1995

D2: EP-A-0 652 536 (Matsushita Electric) 10 May 1995

V: Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Novelty and inventive step are assessed under the proviso of the objections raised under item VIII below.
- 2 The closest piece of prior art on file appears to be document D1.
 - 2.1 D1 discloses a method of processing image data of a plurality of time-separated images (eg, abstract, lines 1-2; page 1, "field of invention") of a body to detect movement of the body (esp., page 1, 1st par.), comprising the steps of
 - for each of a plurality of sampling points in each image calculating and storing a plurality of candidate movements together with a measurement of fit of each candidate (eg, page 3, 4th and 5th par., and claims 1 and 6: items (1) and (2));
 - adjusting for each candidate movement the measurement of fit according to measurements of fit for adjacent samples in the same image (eg, page 4, 1st par., and claim 6: item (4)); and
 - generating from the recalculated probabilities a motion field indicative of the body motion (pages 3 and 4, loc. cit., and claims 1 and 6: item (3)).
 - 2.2 The following differences between the disclosure of D1 and the subject matter of claim 1 remain:
 - 2.2.1 D1 does not explicitly mention "non-rigid body motion" while claim 1 does.

On the one hand, however, D1 does mention a variety of motions which it can deal with (page 1, 1st par.). This enumeration includes "motion in ... shape" (page 1, 1st par.) which implies that the method of D1 can also

handle non-rigid body motion. Moreover, the application domain of the present application is explicitly mentioned to belong to the application domains of D1 (page 25, last par. - page 26, 2nd par.).

On the other hand, there is no technical feature in claim 1 which were specifically adapted to deal with non-rigid bodies instead of rigid ones and none appears to be obvious or implicit; hence, the mere mention of "rigidity" is considered not to limit the scope of claim 1.

- 2.2.2 D1 does not talk about probabilities in contrast to claim 1 but only about an appropriate "measurement of fit" (or: similarity measure).

Both concepts are, however, closely related. In fact, the skilled person knows that all relative quality measures correspond to probabilities if normalized (see present claim 4). Therefore, there is no operation on probabilities which could not just as well be performed on (non-normalized) similarity measures and, notably, only elementary mathematics is needed to transform one into the other.

This includes in particular the adjusting of some probabilities on the basis of others (cf, claim 1, page 20, lines 8-10 and D1, page 4, item (4)).

- 2.2.3 Claim 1 requires "iterative recalculation" of the probabilities of the candidate movements whereas D1 discloses an "adjusting" step. However, it is considered that this difference is not, according to claim 1, an essential one.

On the one hand, according to circumstances an iteration may be terminated already after a single step.

On the other hand, the field of image processing is full of iterative algorithms. Since the "recalculation step" of claim 1 changes all candidate movements at once, it is obvious for the skilled person that an iteration may be needed if a certain global condition is to be established (say: smoothness of the final vector field). Therefore, the mere iteration of a known "recalculation" is considered to fall well within the competence of any person skilled in the art.

- 2.3 In summary, the subject matter of claim 1 is considered not to involve an inventive step in view of the prior art on file, in violation of Article 33 (3) PCT. By analogy, this assessment applies to independent claims 19 and 20 just as well.

- 3 With respect to the dependent claims, the following is observed.
- 3.1 Claims 2 and 3: The "recalculation" based on "neighbouring samples" (claim 2) is known from D1 ("adjacent"; claim 6, item (4)), and the selection of sampling points along a grid according to claim 3 is well-known in the prior art.
- 3.2 Claim 4: The close relationship between similarity measures and probabilities has been considered above - and, hence, the obviousness of moving from one to the other - and the computation of vector displacements is well-known in the prior art.
- 3.3 Claim 5: The similarity measures enumerated in claim 5 are well-known and so is the fact that various similarity measures can be used for image registration.
- 3.4 Claims 6-9 lack clarity (see items VIII.7.3 and 7.4 below). However, it would seem that a clear and sufficiently complete specification of the Bayesian theory underlying the "recalculation step" (according to pages 11-13 of the description) are likely to yield a claim in accordance with Article 33 (1-3) PCT.
- 3.5 Claims 10 and 11: The adaptation of motion vector fields by reference to only the "similar ones" is known from D2 (eg, abstract, claim 1, page 8, lines 39-47).
- 3.6 Claim 12 is not clear (see item VIII.7.5 below).
- 3.7 Claims 13-15: Selecting the "best fit" motion vector for each sampling point is known from D1 (claims 1 and 6, item (3)), and using the motion vector field to define and perform an image transformation is common-place in image registration.
- 3.8 Claim 16: It is obvious for the skilled person that the sampling point density and the presumed image differences have opposite impact on quality and cost of matching these images.

If the images are rather different, ie, the motion between both is large, the matching points must be searched in large regions which is computationally expensive. On the other hand, the image matching is the more accurate the more sampling points can be considered. Thus, as a matter of computational economy

it is obvious to repeat the image matching with successively higher resolution.

- 3.9 The application domain according to claim 17 is known from D1 (par. bridging pages 25 and 26) and the refinement of claim 18 is obvious in view of this disclosure of D1.

VII: Certain defects in the international application

- 4 The phrase on page 15, line 23, which states to incorporate by reference the contents of a prior art document should have been deleted according to the PCT Guidelines II-4.17.
- 5 Some of the indexes in the equations on pages 11-14 appear to be inaccurate. Specifically, on page 12, equation (3), the "x" should be an index of the "u", indexes "S\ x" and "S/x" appear to mean the same thing (eg, page 12, equation (2) and line 8), and the meaning of said "S" as part of "S\ x" appears to be undefined.

VIII: Certain observations on the international application

- 6 The present claims violate Article 6 PCT for the following reasons:
- 6.1 The vague reference to "other sampling points" in claims 1, 19 and 20 (eg, page 20, line 10) is considered to be inappropriately vague. Rather, the reference to a "neighbourhood" as in claim 2 appears to be an essential feature of the invention (PCT Guidelines C-III, 3.4).
- 6.2 The difference between the iteration according to claims 1, 19 and 20 and a one-time-adjustment is insufficiently clear (cf, item V.2.2.3 above).
- 6.3 In claim 6 it is not clear which "stored probabilities" are to be multiplied. The intuitive meaning of "the stored probabilities" (page 21, line 3) - namely all of them - is inaccurate. In fact, as claim 7 clarifies, only one motion vector per sampling point is considered at each time.
- 6.4 Moreover and with respect to claims 6-8, the multiplication of probabilities does

not normally yield a meaningful probability without further operations such as normalisation. Thus, at it stands, the subject matter of claims 6-8 is inappropriate for iteration (cf, also description, page 12, lines 10-11).

- 6.5 From claim 12 it is not clear how the number of iterations could and actually does depend on "the distance between salient points in the image".
- 6.6 Independent claims 21-23 are unacceptable under Article 6 PCT due to their vague reference to what is "described" in the application and what is "illustrated" in the drawings. This phrasing leaves open the precise scope of the claims and, thereby, the claimed subject matter remains unclear (cf, also Rule 6.2 (a) PCT).